

ABSTRACT

Methods and apparatus for operating an ultrasonic flow meter to accurately estimate the average flow velocity in a pipe when the meter has at least one failed chord and one non-failed chord. The method partitions the velocity range into a number of consecutive, non-overlapping “bins,” where separate bins are maintained for each chord and each flow direction. Each bin stores a chord proportion value and, in some embodiments, a chord velocity value. The bins are initialized with pre-selected values and, during normal operation, updated, or trained, based on the measured velocities. When a chord fails, and there is at least one non-failed chord, an estimated proportion value for each non-failed chord is generated using the values stored in the bins. The estimated average flow velocity is then calculated by dividing the summation of the measured flow velocities, from the non-failed chords, by the summation of the estimated proportions.